

CLAIMS

What is claimed is:

1. A press-forming device having a punch, die and blank holder, and press-forming a material according to a prescribed forming condition, comprising:

at least two or more means of

a material characteristic input means inputting at least one material characteristic out of material characteristics of sheet thickness, yield strength, 0.2% proof stress, tensile strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness, of the material;

a material characteristic measurement means measuring at least one material characteristic out of the material characteristics of sheet thickness, yield strength, 0.2% proof stress, tensile strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness, of the material before forming; or

a state variable detector measuring at least one state variable out of the state variables of punch reaction, metal mold temperature, metal mold distortion amount, work piece deformation amount, or work piece temperature during forming the material;

and further comprising:

a processing condition computer computing at least one processing condition out of the processing conditions of forming speed, blank holding force or metal mold temperature from at least two or more pieces of information out of material characteristics inputted by the material characteristic input means, material characteristics measured by a material characteristic measurement means or material state variable during forming measured by the state variable detector;

a processing condition controller controlling at least one processing condition out of the processing conditions including punch or die movement speed, metal mold temperature or blank holding force based on the processing condition computed by the processing condition computer.

2. The press-forming device according to claim '1, wherein said material characteristic input means comprises any one of or a combination of a manual input device, a bar code reader, an IC tag reader, a flexible disc or a photomagnetic disc reader.

3. A press-forming method using a press-forming device having a punch, die and blank holder, and press-forming a material according to a prescribed forming condition, comprising:

at least two or more steps of
inputting at least one material characteristic out of the material characteristics of sheet thickness, yield strength, 0.2% proof stress, tensile

strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness of the material;

measuring at least one material characteristic out of the material characteristics of sheet thickness before forming, yield strength, 0.2% proof stress, tensile strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness of the material before forming; or

measuring at least one state variable out of the state variables of punch reaction, metal mold temperature, metal mold distortion amount, work piece deformation amount, or work piece temperature, during forming the material;

and further comprising the steps of:

computing at least one processing condition out of the processing conditions of forming speed, blank holding force or metal mold temperature from at least two or more pieces of information out of material characteristics inputted by the material characteristic input step, material characteristics measured by a material characteristic measurement step or a material state variable during forming measured by the state variable detection step; and

controlling at least one control condition out of

the processing conditions including punch or die movement speed, metal mold temperature or blank holding force based on the processing condition computed by the processing condition computation step.

4. The press-forming method according to claim 3, wherein said material characteristic input step comprises any one of or a combination of a manual input method, a bar code read method, an IC tag read method, a flexible disc or a photomagnetic disc read method.

5. A press-forming method using a press-forming device having a punch, die and blank holder, and press-forming a material according to a prescribed forming condition, comprising the steps of:

measuring at least one or more state variables out of the state variables of punch reaction, metal mold temperature, metal mold distortion amount, work piece deformation amount, or work piece temperature, for every forming of the material;

computing at least one processing condition out of one kind or two or more kinds of processing condition of forming speed, blank holding force, or metal mold temperature according to comparison result with the past state variables;

controlling at least one or more processing conditions out of the processing conditions including a punch or die movement speed, metal mold temperature or blank holding force based on the processing conditions computed by the processing condition

computation step.

6. The press-forming method according to claim 5, further comprising the steps of:

inputting at least one material characteristic out of the material characteristics of sheet thickness, yield strength, 0.2% proof stress, tensile strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness, of the material,

wherein said processing condition computation step computes at least one processing condition out of the processing conditions of forming speed, blank holding force, or metal mold temperature from material characteristics inputted by said material characteristic input process and from state variables of the material for every forming processing measured by said state variable detection step.

7. The press-forming method according to claim 5, wherein the comparison result with the past state variables is the result of comparing the difference between the past state variable and that of the present value, the moving average value and the prescribed value within a prescribed time period or a prescribed number of times.

8. The press-forming method according to claim 6, wherein said comparison result with the past state variables is the result of comparing the difference between the past state variable and that of the

present value, the moving average value and the prescribed value within a prescribed time period or a prescribed number of times.

9. A computer program product to be used in a computer for a press-forming method using a press-forming device having a punch, die and blank holder, and press-forming a material according to a prescribed forming condition, comprising:

at least two or more steps of

a material characteristic input step inputting at least one material characteristic out of the material characteristics of sheet thickness, yield strength, 0.2% proof stress, tensile strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness of the material;

a material characteristic measurement step measuring at least one material characteristic out of the material characteristics of sheet thickness, yield strength, 0.2% proof stress, tensile strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness of the material before forming; or

a state variable detection step measuring at least one state variable out of the state variables of punch reaction, metal mold temperature, metal mold distortion amount, work piece deformation amount, or

work piece temperature, during forming the material,
and the steps to be executed in a computer,
comprising:

computing at least one processing condition out
of the processing conditions of forming speed, blank
holding force or metal mold temperature from at least
two or more pieces of information out of material
characteristics inputted by said material
characteristic input step, material characteristics
measured by said material characteristic measurement
step or the material state variable during forming
measured by said state variable detection step; and

controlling at least one processing condition out
of the processing conditions including punch or die
movement speed, metal mold temperature or blank
holding force based on the processing condition
computed by the processing condition computation step.

10. A computer readable recording medium on which
a program product is recorded, said program product
for a press-forming method using a press-forming
device having a punch, die and blank holder, and
press-forming a material according to a prescribed
forming condition, comprising:

at least two or more steps of
inputting at least one material characteristic
out of the material characteristics of sheet
thickness, yield strength, 0.2% proof stress, tensile
strength, elongation, n value, r value, stress-strain
relation equation, hardness, temperature, surface

roughness, friction coefficient, or lubricant film thickness of the material;

measuring at least one material characteristic out of the material characteristics of sheet thickness, yield strength, 0.2% proof stress, tensile strength, elongation, n value, r value, stress-strain relation equation, hardness, temperature, surface roughness, friction coefficient, or lubricant film thickness of the material before forming; or

measuring at least one state variable out of the state variables of punch reaction, metal mold temperature, metal mold distortion amount, work piece deformation amount, or work piece temperature, during forming the material,

and the steps to be executed in a computer, comprising:

computing at least one processing condition out of the processing conditions of forming speed, blank holding force or metal mold temperature from at least two or more pieces of information out of material characteristics inputted by said material characteristic input steps, material characteristics measured by said material characteristic measurement step or material state variable during forming measured by said state variable detection step; and

controlling at least one processing condition out of the processing conditions including punch or die movement speed, metal mold temperature or blank holding force based on the processing condition

computed by the processing condition computation step.